Got the HOTS for Math?

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The Math Projects Journal
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Teaching Critical Thinking… Intentionally!

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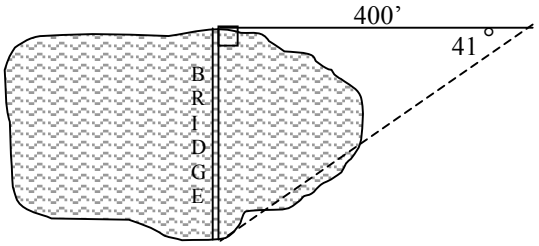
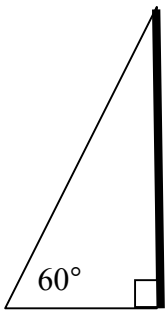
Got the HOTS (Higher Order Thinking Skills) for Trig Name _____

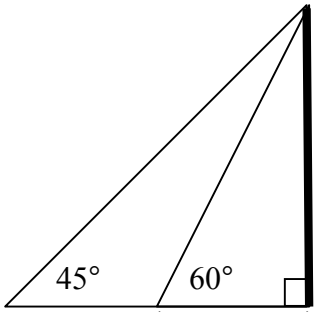
1. You want to build a bridge across a lake but can't walk across the lake and measure it directly. So you measure the following distances and angles. How long will the bridge be (to the nearest foot)?



2. There is a pole with a guy wire attached to the top and anchored at a sixty degree angle with the ground ten feet from the pole (as shown below left). Then another wire is anchored to form a 45° angle and a third to form a 30° angle. How far from the pole are each of the other two wires anchored?



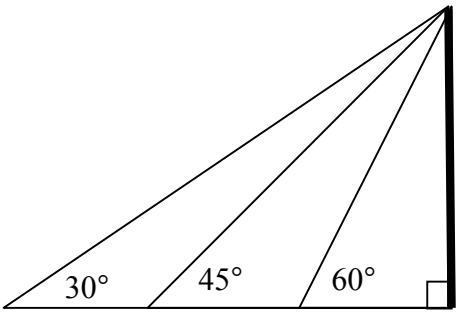
d = 10'



|---- 10' ---|

|---------- d_1 ----------|

d_1 = _____'



|---- 10' ---|

|---------- d_2 ----------|

d_2 = _____'

3. Angle A has a larger tangent ratio than angle B. Which angle is larger? Justify your answer by any means other than citing instances from your calculator.

4. Suppose the owner of the factory needs to install a new ramp for the loading dock. The ramp makes a 5° angle with the ground. How far will this ramp extend from the loading dock? Explain.

5. The hypotenuse of a right triangle measures 9 inches, and one of the acute angles measures 36°. What is the area of the triangle? (Round to the nearest square inch.)

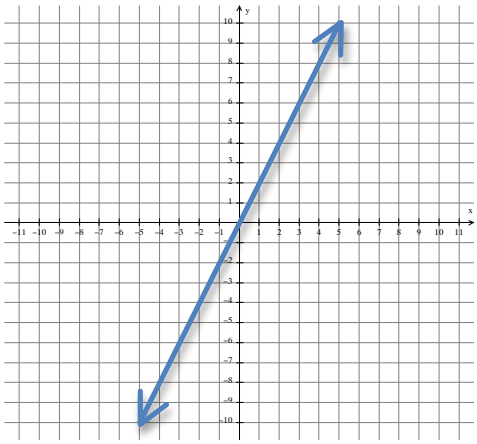
6. Duffy thinks that since sine involves the *opposite* side, and cosine involves the *adjacent* side, and that tangent is defined as the ratio of *opposite* to the *adjacent* side, that the tangent of an angle will equal the sine divided by the cosine of the angle. Mathematically support or refute his claim below.

$$\tan A = \frac{\sin A}{\cos A}$$

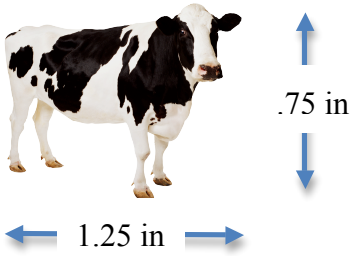
7. Given the three points B(-2, -4), C(3, 3), D(-2, 3), find all three angle measures of ΔBCD.

8. a) Show that the slope of the line below is equivalent to the tangent of the angle formed with the x-axis.

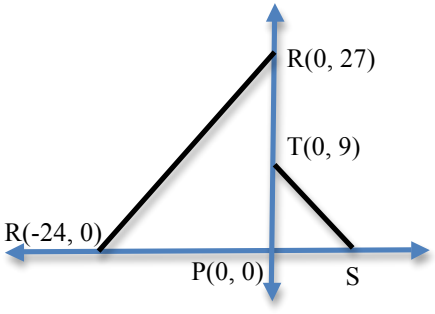
   b) Is this true for all lines?



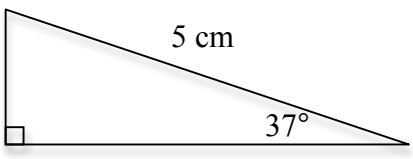
9. The dimensions of the following picture are given. If the true cow is 84" long, how tall is it?



10. Given that ΔPQR ~ ΔPST, find the scale factor and the coordinates of S.



11. Find the lengths of the legs in the triangle below (rounded to the nearest whole unit). Use the Pythagorean theorem to confirm your answer.

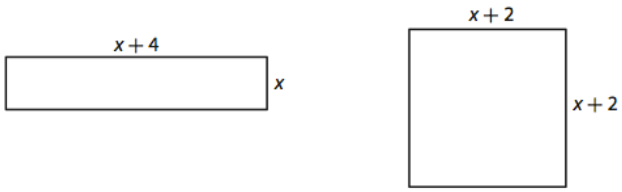


Chris Shore, Algebra 1
Great Oak HS

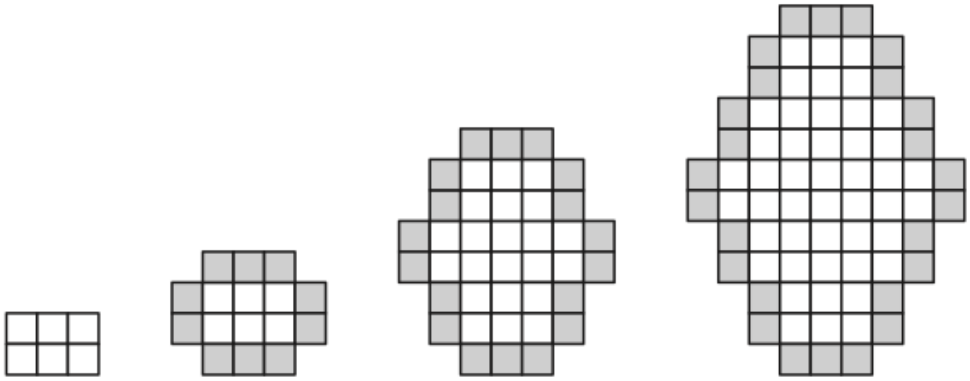
Name _____

H.O.T.S.
(Higher-Order Thinking Skills)
Unit 1: Quantities, Equations & Inequalities

1) A student is given the rectangle and the square shown. The student states that the two figures have the same perimeter. Is the student correct? Explain your reasoning.



2) Jerry is planting white daisies and red tulips in his garden and he wants to choose a pattern in which the tulips surround daises. He uses tiles to generate patterns starting with two rows of three daises. He surrounds these daisies with a border of tulips. The design continues as shown.



a) Jerry writes the expression $8(b - 1) + 10$ for the number of tulips in each border, wherein b is the border number and $b \geq 1$. Explain why Jerry's expression is correct.

b) Elaine wants to start with two rows of four daisies. Her reasoning is that Jerry started with two rows of three daisies and his expression was $8(b - 1) + 10$, so if she starts with the two rows of four daises, her expression will be $10(b - 1) + 10$. Is Elain's statement correct? Explain.

3) A veterinarian is changing the diets of two animals, Simba and Cuddles. Simba currently consumes 1200 Calories per day. That number will decrease by 100 Calories each day. Cuddles currently consumes 3230 Calories a day. That number will decrease by 190 Calories each day. If these patterns continue, how many days will take for the animals to be consuming the same number of calories? How many Calories will the animals be consuming each day then?

4) Lisa is 10 centimeters taller than her friend Ian. Ian is 14 centimeters taller than Jim. Every month, their heights increase by 2 centimeter. In 7 months, the sum of Ian's and Jim's heights will be 170 centimeters more than Lisa's height. How tall is Ian now?

5) Given the table below, after how many years are the salaries offered by Company A and Company B the same?

	Starting Salary	Yearly Salary Increase
Company A	$24,000	$3000
Company B	$30,000	$2400
Company C	$36,000	$2000

6) Sven is trying to find the maximum amount of time he can spend practicing the five scales of piano music. So, Sven sets up the following inequality, where t is the number of minutes he spends on each scale, and solves it.

$$60 - 5t \leq 25$$
$$-5t \leq -35$$
$$t \geq 7$$

a) According to his inequality, how many total minutes does he have to practice?

How many minutes does he have to practice things other than his scales?

What does the t represent?

b) Sven solved his inequality and concluded that he should spend 7 minutes or more on each scale. Is this correct? If not, what mistake did he make? Then solve for the correct answer.